

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claims 1-13 (canceled)

14. (new) A method of purifying calcium sulfate (CaSO_4), particularly enabling CaSO_4 to be separated from other materials, said method comprising the steps:
- (a) contacting the calcium sulfate and other materials with an aqueous medium at neutral or alkaline pH, and an acid-soluble chemical chelating reagent suitable for chelating calcium, thereby forming an aqueous chelate solution; and
 - (b) recovering calcium sulfate by lowering the pH of said chelate solution with a mineral acid, whereby calcium sulfate is selectively precipitated from said solution.
15. (new) A method according to claim 14, further comprising the step of separating the aqueous chelate solution from any insoluble material by a mechanical treatment.
16. (new) A method according to claim 15, wherein said mechanical treatment comprises centrifugation.
17. (new) A method according to claim 15, wherein said mechanical treatment comprises filtration.
18. (new) A method according to claim 15, wherein the separated aqueous chelate solution is titrated back to a pH above about pH 4 and recycled for use in a further round of CaSO_4 extraction.
19. (new) A method according to claim 14, wherein the calcium chelating agents are polydentate molecules that are modified, by addition or substitution, with a solubilizing functional group to improve water solubility thereof.

20. (new) A method according to claim 19, wherein the solubilizing group enables the chelating agent to remain soluble below pH 4.

21. (new) A method according to claim 19, wherein the solubilizing functional group is a quaternary ammonium group.

B1
22. (new) A method according to claim 14, wherein the chelating agents are selected from the group consisting of 4-(carboxymethyl)-2-(trimethylamino)pentane-1,5-dicarboxylic acid; 2-(carboxymethyl)-2-(trimethylamino)butane-1,4-dicarboxylic acid; 2-(carboxymethyl)-3-(trimethylamino)-butane-1,4-dicarboxylic acid; and sodium salts of any one of the aforesaid dicarboxylic acids.

23. (new) A method according to claim 14, wherein the chelating agent chelating functionality is selected from the group consisting of sulfonic acid and carboxylic acid functionalities.
